



Customer Satisfaction Membrane

CSM RO MEMBRANE, The approved **Reverse Osmosis Membrane** in the world.

RE8040-FEⁿ

High productive new fouling resistant RO membrane element with extended are for brackish water and waste water reuse

Product Specifications

Permeate Flow rate : 10,500 GPD (39.7 m³/day)

Stabilized Salt Rejection : 99.7 %

Effective Membrane Area : 400 ft² (37.2 m²)

1. The stated performance is initial data taken after 30 minutes of operation based on the following conditions;
2,000 mg/L NaCl solution at 225 psig (1.5 MPa) applied pressure, 15 % recovery, 77 °F (25 °C) and pH 6.5~7.0.
2. Minimum salt rejection is 99.4%.
3. Permeate Flow rate for individual elements may vary but will be no more than 10 below the value shown.
4. Effective membrane area may vary within 3 %.
5. All elements are vacuum sealed in a polyethylene bag containing 1.0 % SBS (Sodium bisulfite) solution and packaged individually in a cardboard box.

Product Description

Membrane Type : Thin-film Composite

Membrane Material : PA (Polyamide)

Membrane Surface Charge : Close to Neutral

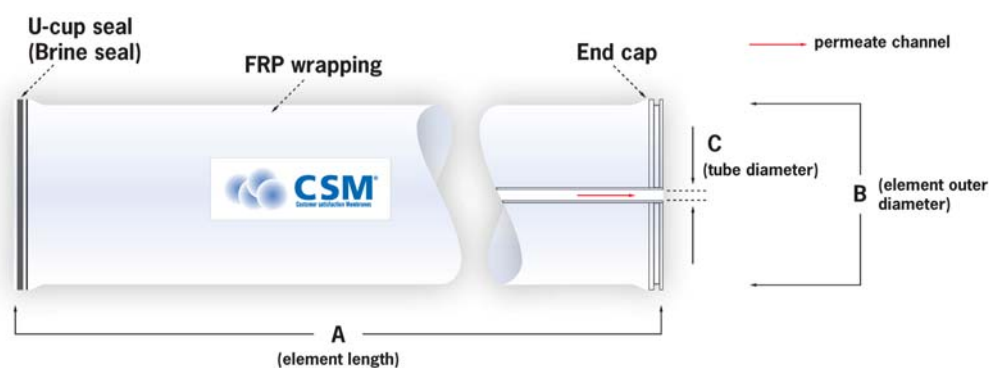
Element Configuration : Spiral-Wound, FRP wrapping

Product Dimensions

A = 40 inch (1,016 mm)

B = 16 inch (400 mm)

B = 1.12 inch (28 mm)



1. One interconnector (coupler) would be supplied for each membrane element.
2. All CSM membrane elements fit nominal 8.0-inch (203 mm) I.D. pressure vessel.
3. Outer feature may vary as design revisions take place.

Features

- CSM FEⁿ element provides an excellent way to treat a feed water having relatively high fouling potential due to the remaining colloidal, biological and organic fouling agents even after controlled pretreatment.
- CSM FEⁿ element has a high durability against CIP chemicals to sustain fouling resistant performance even after periodic CIP in a long term operation



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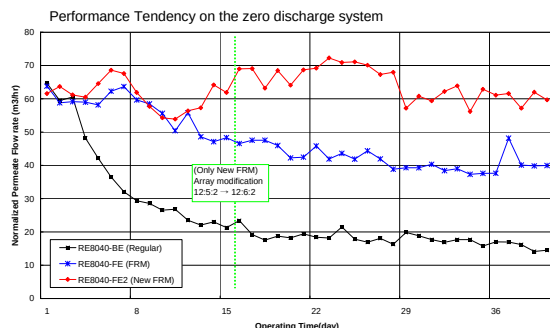
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Fouling Resistance Characteristics

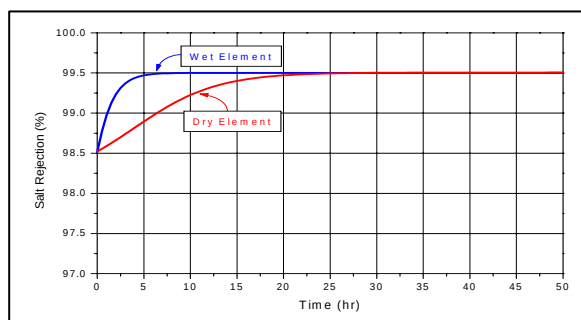


Fouling resistance characteristics of regular, FRM, and new FRM membranes tested under conditions of zero liquid discharge system. CSM New FRM maintains nearly the initial flux over 30 days, while FRM loses 30 % initial flux and the regular membrane loses 70 % of the initial flux.

Conditions for Handling CSM in general

- Customers must keep the element boxes dry at room temperature to prevent them from freezing and damages from heat. If the polyethylene bag is broken, a new protective solution has to be added to the RO membrane element and the element has to be repackaged air-tight to prevent from biological growth.
- Keep elements moist at all times after initial wetting
- Permeate water obtained from first hour of operation should be discarded in order to flush the protective solution in the elements.
- CSM elements should be immersed in a protective solution during storage, shipping or system shutdowns to prevent biological growth and freeze damage. The standard storage solution contains one (1) weight percent sodium bisulfite or sodium metabisulfite (food grade). For short term storage of one week, one (1) weight percent sodium metabisulfite solution is adequate for inhibiting biological growth.
- The customer is fully responsible for the effects of incompatible chemicals on elements. Their use will void the element limited warranty.

The Stabilization of salt rejection Characteristics



- CSM RO elements could be supplied either wet or dry state.
- The stabilization of system rejection largely depends on the feed water conditions and operating parameters

Application Data

Operating Limits

- Max. Pressure drop / Element 15 psi (0.1 MPa)
- Max. Pressure drop / 240" vessel 60 psi (0.42 MPa)
- Max. Operating pressure 600 psi (4.14 MPa)
- Max. Feed flow rate 252 gpm (57.2 m³/hr)
- Min. Concentrate flow rate 64 gpm (14.5 m³/hr)
- Max. Operating temperature 113 °F (45 °C)
- Operating pH range 3.0 ~ 10.0
- CIP pH range 2.0 ~ 11.0
- Max. Turbidity 1.0 NTU
- Max. SDI (15 min) 5.0
- Chlorine concentration < 0.1 mg/L

Design Guideline for Various Water Source

- Waste water (SDI < 5) 8 ~ 12 gfd
- Waste water pretreated by UF (SDI < 3) 10 ~ 14 gfd
- Seawater, open intake (SDI < 5) 7 ~ 10 gfd
- High salinity well water (SDI < 3) 8 ~ 12 gfd
- Surface water (SDI < 5) 12 ~ 16 gfd
- Surface water (SDI < 3) 13 ~ 17 gfd
- Well water (SDI < 3) 13 ~ 17 gfd
- RO/UF permeate (SDI < 1) 21 ~ 30 gfd

Saturation Limits for Salts

- CaSO₄ 230 % saturation
- SrSO₄ 800 % saturation
- BaSO₄ 6,000 % saturation
- SiO₂ 100 % saturation

Above values are saturation limit at the tail end of the membrane elements for each sparingly soluble salts with proper scale inhibitor.

CaCO₃ Scaling potential limits as LSI or SDSI

- Without scale inhibitor < -0.2
- LSI (SDSI) with SHMP < +0.5
- LSI (SDSI) with special inhibitor¹ < +1.5
- SDSI with any inhibitor < +0.5

- Special inhibitor means one of approved organic inhibitors. It should be approved from real plant for more than three years.



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